Mediterranean Information Office
for Environment, Culture & Sustainable Development

MIO-ESCDE Position Paper on Nanotechnologies

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Introduction

At the turn of the millennium, modern synthetic chemistry has reached the point where it is possible to control and manipulate matter at atomic, molecular or macromolecular level and manufacture components at the nanoscale (dimensions below 100nm). Nanotechnology is considered to be an innovative high-end technology which has the potential to fabricate many new advanced and novel materials, devices and systems with wide-ranging applications, such as in medicine, electronics, and energy production. Molecular manufacturing is indeed very promising and many prospective applications can possibly solve many of the world's current problems.

As nanotechnology moves rapidly from research and development to commercialization, concerns both among scientists and the wider public have grown on potential risks posed to the environment and human health due to the new, previously unknown, properties attributed to engineered nanoparticles. Commercialization of nanoapplications and nanoproducts is proceeding quickly, with a large number identified already in the market. However, consumers and workers are not fully informed or even aware of this.

MIO-ECSDE has recently been involved in a European project entitled NanoCap (acronym for "Nanotechnology Capacity Building NGOs") with the aim to deepen its understanding of the environmental, occupational health and safety issues and related ethical aspects of nanotechnologies and be able to inform through its member organizations also the general public.

In particular, MIO-ECSDE wishes to bring in the project and in the relevant European and International fora an objective and representative view and perspective of the Mediterranean civil society on emerging nanotechnology issues, many of which might have a significant influence on the sustainable development of the region.

The present Position Paper is therefore intended to present MIO-ECSDE views on current nanotechnology developments and could also serve as a basis for planning concerted NGO actions in the region, lobbying at national and regional levels for suitable legislative frameworks regulating nanotechnologies and their applications, informing and raising awareness of the wider public and of concerned stakeholders (educators, journalists, Parliamentarians, etc.) on nanotechnology issues.

The Position Paper, endorsed by the MIO-ECSDE Executive Bureau in December 2007, was finalized in January 2009 by integrating the input and feedback of its members and other partners/stakeholders in the Mediterranean.

Through our involvement in the NanoCap project we are gaining a deeper understanding of this new and rapidly evolving technological field and the present position paper is meant to be a "living" document which will probably need to be adapted to the developments we will witness again and again in the near or more distant future.

1. Policy & Regulatory issues

1.1. Free nanoparticles, nano-substances and materials as a whole should be defined, treated and labeled as a new class of substances, considering that nanoparticles have different properties and behaviors than their correspondent bulk materials. Urgent action is needed in relation to free nanoparticles against which there is no protection at the moment. Our knowledge on their impact is, at present, very limited, therefore we have to approach them through analogues and similarities with known categories of particles. Free nanoparticles can be inhaled, ingested or can enter the body via the skin, and cause damage to cells and organs. Nanotubes (nanometer scale wire-like structures), for example, which are most often composed of carbon, have features very similar to those of asbestos fibres, silica or hard metal particles. Fibres of asbestos are associated with high carcinonegenic risks and are harmful to human health; silica and hard metal particles are reported to induce DNA damage and mutations to animal models, after chronic inhalation. It has been demonstrated that nanotubes can induce inflammatory reactions as induced by asbestos. Also, there is some evidence that nanoparticles can enter into the cells and generate reactive oxygen species (ROS) and cause oxidative stress.

1.2. A clear, harmonized and internationally accepted definition of nano-technologies and nanomaterials should be adopted to avoid inconsistencies along the "risk governance cycle" and enhance the applicability of existing and future legal frameworks.

1.3. The precautionary principle approach should be adopted before producing and introducing nano-materials in the market for consumer use. This would help avoid the mistakes made in the case of GMOs, which have entered our daily lives without being properly tested for short and especially long-term effects on human health and the environment. The precautionary principle should cover the entire life-cycle of nano-particles and materials. Full life cycle analysis is one of the effective means of approaching the complex question of how nano-structured materials might affect the environment and human health. It involves mapping fate and transport at every step, from production inputs to final disposal or dispersal.

1.4. A relevant regulatory framework is urgently needed to secure proper governance and transparency and to set the limits for nanotechnology applications that might be harmful to human health and the environment, before they become the norm. At the European level, the REACH legislation should be revised to ensure that nanomaterials do not "slip through" by not reaching the threshold of 1ton per year of manufacture or import. Consequently, at least the 'no data no market' principle will address the concerns about environmental, occupational health and safety risks.

1.5. Although existing voluntary codes for the safe development and the responsible use of nanoscaled materials (e.g. the European Commission's Code of Conduct for Responsible Nanosciences and Nanotechnologies Research, the Responsible NanoCode) provide orientation, guidance and benchmarks for the responsible research, production and use of nanomaterials, they will fail to reduce risks and respond to public concerns, unless mandatory provisions are foreseen.

1.6. All consumer items already available on the market and containing nano-particles and/or nano-materials should be adequately labeled to allow their easy identification. Currently, it is not required to state the nano-properties of products on their labels, while some enterprises have used the nano-label as a means of publicity and marketing, sometimes without relevance to the real content of nano-engineered particles in their items.

2. Research & Development Issues

2.1. Nano-research and technical application should be driven by real societal needs and priorities and based on ecological, social and sustainable development considerations and not on the 'marketability' of products only. Most of the nano-products present in the market are of 'accessory' nature, e.g. they do not serve impelling human or environmental needs, such as health, safety, pollution prevention and remediation, etc. but rather minor necessities (cosmetics, textiles, sport items, etc.).

2.2. Research and testing is needed to provide a scientific basis for policy frameworks to deal with uncertainties and risks of nanotechnologies. In particular, there is an urgent need for additional toxicological and ecotoxicological studies, tests and protocols (all still very limited) to elucidate health and environmental impacts, as it has been shown that the ones available (targeted to bulk chemicals and substances) might not be suitable for the assessment of nano-risks.

2.3. Public research programs need to play an important role in providing greater incentives and encouragement for nanotechnologies that support sustainable development and do not endanger humanity's well-being in the long-term.

2.4. The existing imbalance in funds allocated to nanotech research needs to be corrected so that impact assessment and minimization and not only application come high in the agenda. Research into the potential hazards of nanomaterials should keep pace with new developments.

2.5. With reference to the above point, **civil society and the public in general should always be actively involved in discussions directed to setting priorities for nano-research and application, particularly when this is supported by public money.**

2.6. There is an urgent need for standards to effectively support legislation and a regulatory framework for risk assessment of nanomaterials and nano-particles as well as for communication (standards on definitions) and methods for sampling and measurement.

3. Awareness & Communication issues

3.1. A transparent and effective communication of the risks of nanotechnologies to society is needed. The public's understanding should not only be limited to application potentials and future opportunities (which in most occasions have not achieved the status of expectation and are simply just assumed) of the new technologies/materials but particularly on their actual risks.

4. Nanotechnology issues specific to developing countries

4.1. There is a need to connect the development of nanotechnologies with the development of poor nations and neighborhoods in order to meet internationally agreed poverty reduction goals, such as the Millennium Development Goals (MDGs). Millions of people lack access to safe water, efficient sources of energy, health care and education. Nanotechnologies may promise effective solutions in these areas. Yet, there appears to be very little effort among the various sectors of society (governments, NGOs, business, donors, and

academia) to act effectively in this direction. Although most industrial countries' governments and some governments in the developing world are investing heavily in nanotechnologies, little of this investment is presently going towards the benefit of the poor, even in the countries where a large proportion of citizens are poor.

4.2. **Governments should assure transparency and citizens participation in the way public money is spent in support of developing emerging technologies. Focus should be given to the needs of the poor rather than at improving national corporate competitiveness in nanotechnologies.** Universities and Research Institutes receive much of their funding for nano-research through government programs. However, much of this funding goes to research that supports corporate interests. Universities should play a key role in managing innovation (patenting and licensing advances) to ensure that developing countries can reap the benefits from publicly funded nano-research.

4.3. **In order to meet human needs in developing countries it is important to anticipate the impacts of nano-related governmental and corporate policies through the active involvement of civil society and the wider public in any discussion related to nano-developments.** The potential benefits of nanotechnologies may be in the coming, but in the meantime the technology is controlled mainly by developed countries and multinational corporations (e.g. through patents and conditions in technology licenses) a process which primarily benefits consumers in the North and leads to a deeper divide between developed and developing countries.

4.4. **Attention should be paid to specific risks that might affect developing countries due to their particular environmental and social conditions.**